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a description of the Bart Impact Program

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The Metropolitan Transportation Commission

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RALPH TROWER
Representing Napa County

(vacant)
Representing U.S. Department of Housing and Urban
Development

Hotel Claremont
Berkeley, California 94705

the Bart Impact Program

a comprehensive ssessment of the impacts of e San Francisco Bay Area apid Transit System

**E PUBLIC AGENCIES
RTICIPATING IN THE PROGRAM:**

U.S. Department of Transportation
U.S. Department of Housing and Urban Development
California Department of Transportation
Metropolitan Transportation Commission

**HE PRINCIPAL MTC STAFF
ONCERNED WITH THIS PROGRAM:**

PAUL C. WATT
(Executive Director)
Project Director

NOEL R. MARSH
(Assistant Director, Transportation Impacts)
Project Manager

HENRY BAIN
(Consultant)
Technical Manager

March 1974

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This is a reprint of a brochure first published in July, 1973. This printing incorporates a few small revisions in the text, and adds two new sections ("Progress Since July, 1973" and "Current Issues") which will bring the reader up to date.

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INTRODUCTION

The BART Impact Program is a comprehensive, policy-oriented study and evaluation of the impacts of the San Francisco Bay Area's new rapid transit system (BART).

The program is financed by the U.S. Department of Transportation, the U.S. Department of Housing and Urban Development, and the California Department of Transportation. Financial support for some program activities is also expected from the National Science Foundation and other organizations.

The program is being conducted by the Metropolitan Transportation Commission (MTC) under contract with the Federal and state governments. Management of the Federally-funded portion of the program is vested in the U.S. Department of Transportation. The program began in 1972 and is planned to extend through 1976. The estimated funding level for Fiscal Year 1974 is approximately $2 million.

The BART Impact Program covers the entire range of potential rapid transit impacts, including impacts on traffic flow, travel behavior, land use and urban development, the environment, the regional economy, social institutions and life styles, and public policy. The incidence of these impacts on population groups, local areas, and economic sectors will be measured and analyzed. The benefits of BART, and their distribution, will be weighed against the negative impacts and costs of the system in an objective evaluation of the contribution that the rapid transit investment makes toward meeting the needs and objectives of this metropolitan area and all of its people.

The focus of the program is on decisions, actions, and their results: tracing the consequences of the decisions that have produced BART and providing improved understanding to help public officials and citizens make wise decisions in the future. The findings of the program will be widely disseminated to inform decision makers in the Bay Area, in other metropolitan areas throughout the nation, and in the national and state governments. The methods employed in assessing

BART impacts will be documented for possible use in evaluating new transit systems and other transportation improvements elsewhere.

THE BART SYSTEM

The 75-mile BART system, linking downtown San Francisco and Oakland and radiating in four directions, will serve 34 stations. The trackage is nearly equally divided between subway, surface, and overhead construction. The BART cars, of modern design and reaching maximum speeds of 80 miles per hour, are expected to carry an average of 200,000 persons per weekday by 1975. Operations began on the line between Oakland and Fremont on September 11, 1972. The other East Bay lines went into operation in the first part of 1973, and service across the Bay and through San Francisco to Daly City is expected to commence later in 1974.

The system was built and equipped at a cost of $1.5 billion. Most of the funds were provided by bond issues that are being paid off by a property tax and a sales tax levied in the three counties that comprise the BART District (Alameda, Contra Costa, and San Francisco). Other fund sources include toll revenues from the San Francisco Bay bridges and Federal grants. The BART statute provides no tax support for operating costs. Riders pay fares based on distance, ranging from 30 cents to $1.25.

As the first regional rapid transit system to be built in this nation in more than 50 years, BART is of great interest to other metropolitan areas across the country that are considering investments in improved transportation and to the Federal government, which is providing financial aid for local transportation improvements, urban development, and environmental protection in urban areas. There is a need for accurate information on the consequences of the BART investment to guide future decisions, both in the Bay Area and throughout the nation.

THE METROPOLITAN TRANSPORTATION COMMISSION

The Metropolitan Transportation Commission was established by state law in 1970 to perform regional transportation planning for the nine-county Bay Area. It has 19 members appointed by the county and city governments and by Federal, state, and regional agencies concerned with transportation and urban development. (Federal and state members are non-voting.)

The Commission's powers extend beyond planning to approval of construction of any transbay bridges and multi-county transit systems on exclusive rights-of-way. State highway construction is to conform to the Commission's plan except in cases of overriding state interest. The Commission is empowered to allocate state aid for mass transportation, as made available by a 1971 enactment, among claimants within a county. It also reviews and approves applications for Federal aid for transportation improvements of regional significance.

The Commission's regional transportation plan, adopted on June 27, 1973, includes a facilities plan, a ten-year schedule of priorities, and a financial plan, and will be updated annually. The plan takes into account "the ecological, economic, and social impact of existing and future regional transportation systems upon various facets of the region, including, but not limited to, housing, employment, recreation, environment, land use policies, and the economically disadvantaged." The plan also takes into consideration the plans of state and regional agencies for the Bay Area.

The Commission is also participating in a number of transit improvement studies in cooperation with local governments, transit agencies, and the state, with Federal financial support. These include studies of possible extensions of the BART system, coordination of BART and connecting local transit service, provision of transit service in areas now having little or none, and methods of serving persons who are transportation-disadvantaged.

The Commission has an extensive program for communication with citizens and organizations in the communities throughout the nine-county region and for securing their participation in the decisionmaking process. A series of "town meetings" on the regional plan has been held in all of the nine Bay Area counties. Commission members and staff have met with many community groups, and drafts of the regional plan have been distributed to citizens for comment.

ORIGINS OF THE BART IMPACT PROGRAM

Planning for an assessment of BART impacts has been under way for several years. A study proposal was submitted to the U.S. Department of Transportation in June 1971 by the Institute of Urban and Regional Development (IURD) at the University of California, Berkeley, with the support of the BART District and MTC. The proposal was also submitted to the U.S. Department of Housing and Urban Development.

In response, the two departments entered into an agreement to jointly finance the collection of perishable data on pre-BART conditions and the preparation of detailed program plans. Deciding that MTC should be their principal agent to conduct the impact assessment, they contracted with MTC for the initial data collection and program planning. MTC subcontracted the pre-BART data collection to IURD and proceeded with planning for the impact assessment.

At the same time, the California Department of Public Works agreed to finance the collection of data on highway traffic and person-movement in travel corridors affected by BART and contracted with MTC for this purpose.

Data relating to pre-BART traffic flow, travel behavior, environmental quality, and other phenomena were collected beginning in May 1972. Collection of additional pre-BART data and data on conditions following the start of BART operations is continuing with additional funding by the Federal and state agencies.

ORGANIZATION OF THE PROGRAM

Federal policies for the BART Impact Program are prescribed by a policy committee composed of top officials of DOT and HUD. Management at the Federal level is vested in DOT. A staff committee with representation from DOT, HUD, and other Federal agencies provides technical review.

The California Department of Transportation (successor to the Department of Public Works) provides state participation in the program.

Within MTC, the program is the principal responsibility of the Assistant Director for Transportation Impacts, who serves as Project Manager. A Technical Manager is responsible, through the Assistant Director, for all of the technical aspects of the program.

In carrying out the program, MTC will maintain close working relations with the transportation agencies that will be prime sources of data on BART impacts: the BART District itself, the two principal local transit systems (the San Francisco Municipal Railway and the Alameda-Contra Costa Transit District), and District 4 of the California Department of Transportation.

The impact program will also cooperate with the Association of Bay Area Governments and the local governments that are concerned with the planning of urban development in the BART corridors.

The program has had the benefit, since the initial MTC planning, of guidance from a 15 member advisory committee appointed by the National Academy of Engineering at the request of DOT and HUD.

PROGRAM PROCEDURES

The greater part of the program is organized in terms of several major impact areas, in each of which the work is to be performed by a contractor or consortium of contractors. The major impact areas are:

Transportation System and Travel Behavior:

The characteristics and performance of the transportation system, including BART, local feeder transit service, and the related highway system; and the responses of travelers to BART, including changes in mode of travel, route, scheduling of trips, activity locations, and number of trips.

Environment:

The effects of BART and BART-induced changes in travel on neighborhood environmental quality (noise, visual quality, etc.) and on the regional environment (notably air pollution).

Land Use and Urban Development:

Impacts on the distribution of population, activities, and buildings within the metropolitan area, and on the character of urban development and design.

Economics and Finance:

Impacts of the rapid transit system and the bond issues and taxes that finance it on the regional economy and specific economic sectors, including impacts on employment, productivity, and income levels.

Institutions and Life Styles:

The effects of all the foregoing factors on social institutions, patterns of social behavior, and the quality of life, with special attention to specific population groups.

Public Policy:

The effects of BART and its bond issues and taxes on the policies of governments functioning in the Bay Area, including policies relating to transportation, urban development, and public finance.

MTC will assure that the inter-relations among these areas, and especially the feedback of land use and other impacts on the transportation system and travel behavior, are traced.

Some program activities that do not fit within the major impact areas or that require unique capabilities or special organizational arrangements will be carried out under separate contracts by consulting firms, universities, research institutions, and public agencies, and in some cases by MTC itself.

MTC plans to widely publicize the program among consulting firms, local governments in the Bay Area, civic and business organizations of all kinds, and persons throughout the country with a professional interest in transportation impact studies. All such organizations and individuals who express an interest in the program will be kept informed of plans and progress and will be encouraged to participate as appropriate.

Contractors for the major tasks will be selected by means of an initial solicitation of expressions of interest, a pre-qualification process which identifies several best-qualified organizations, distribution of Requests for Proposals to these organizations, selection of the organization submitting the most meritorious and cost-effective proposal, and negotiation of a contract with this organization. No presentations by consulting firms will be entertained until the pre-qualification process is completed.

Opportunities for contractors to participate in the program will be advertised widely, and additional steps will be taken to bring such opportunities to the attention of minority contractors.

PROGRAM FUNDING

Funds for the program come from several sources. A contract between DOT and MTC provides for performance of several program tasks, including Environment and Land Use and Urban Development, as well as program management functions. This contract is financed by an allocation of funds from the office of the Secretary of Transportation and by a transfer of funds from HUD.

A Technical Studies grant from the Urban Mass Transportation Administration to MTC supports most of the work on the Transportation System and Travel Behavior task.

An agreement between the California Department of Transportation and MTC, providing both funds and services of state personnel, supports the collection of data on highway traffic volumes and travel times. The state funds and services also constitute the matching local contribution for the UMTA grant.

THE PROGRAM IN ITS BROADER CONTEXT

The BART Impact Program reflects the growing concern, at all levels of government, that public expenditure programs be evaluated to ascertain how well they achieve their goals and what side-effects they have. Investment of a small fraction of a program's cost in assessment of its results can pay big dividends by showing how to maximize the benefits of expenditures already made, and how to make better decisions in the future.

At the same time, the program may be viewed as another step in the employment of newly developing research methods to advance our understanding of urban travel behavior and the relations between transportation, land use, and other urban phenomena. During the past two decades knowledge of these subjects has been greatly advanced by research in many urban areas, much of it undertaken in support of comprehensive transportation planning. The addition of a new rapid transit system to the Bay Area's complex of transportation modes offers an unparalleled opportunity to apply new techniques for the prediction and explanation of travel behavior and other urban activities — testing their ability to deal with a new mode that is quite different from those already in operation, improving and refining them, and using them to gain a better understanding of the total range of effects of the rapid transit system.

The impact program takes on special significance in the light of current concerns about auto-generated air pollution; the adverse environmental and social effects of further urban freeway construction; the mobility problems of the poor, the elderly, and other disadvantaged groups; and the threat of an energy shortage. A variety of alternatives to ever-increasing reliance on the private automobile have been proposed, but no single prescription has been proven satisfactory. Rail rapid transit is being seriously considered in a number of metropolitan areas, and extensions of the BART system are under consideration in the Bay Area. An appraisal of BART's contribution to this area's transportation needs can help urban areas across the country and around the world to decide how best to plan for their transportation needs.

PROGRAM OBJECTIVES

The objectives of the impact assessment program are to contribute to the making of better decisions on urban transportation and development, and to add to knowledge of these subjects, by providing answers to three kinds of questions:

What are the impacts of BART on travel conditions, economic activity, land use, public policies, and other aspects of life in the metropolitan region?

Why do these impacts occur? Of equal interest, why do some anticipated impacts not occur, or occur in a lesser or different way than expected?

How can the fullest possible benefits be obtained from the Bay Area's investment in rapid transit, by complementary actions such as provision of feeder service, marketing transit service, and zoning for intensive development around the stations? Equally important, how can the lessons of the BART experience be transferred to other metropolitan areas where investments in transportation improvement are being considered?

The three kinds of questions will be asked about BART impact under each of the following headings:

1. Level of transportation service
2. Cost of serving various trips
3. Public attitudes
4. Travel behavior
5. Highway traffic congestion
6. Environmental quality
7. Land use
8. Large-scale patterns of urban development and growth; distribution of population

9. Level and distribution of economic development and employment
10. Institutional patterns and life styles
11. Distribution of social benefits and costs
12. Public policy

A more detailed description of these question topics appears in the section entitled "Appendix: Questions to be Answered".

While focusing on these questions, the program will remain alert for other, unanticipated kinds of impact.

In seeking answers to all of these questions, special attention will be devoted to identifying the incidence of BART impacts, both positive and negative, on various population groups, classified by area of residence, income level, race, age, and other socially meaningful variables.

CONCEPTUAL FRAMEWORK AND RESEARCH DESIGN

The strategy for obtaining answers to these questions is based on a conceptual framework which begins with a focus on decisions and actions. The study seeks to ascertain the consequences of the decisions to build a rapid transit system and to raise more than one billion dollars in local funds (plus Federal aid) to pay for it, and of the many actions taken to carry out these decisions. The guiding objective is to achieve a better understanding of the causal relationships which lead from initial decisions to ultimate result, and thereby to lay a foundation for improved decision-making in the future.

The conceptual framework distinguishes between direct impacts of BART, such as the esthetic effect of erecting elevated structures in a residential neighborhood, or the shift of travelers from autos to rapid transit; and indirect impacts, such as land use changes resulting from changes in travel patterns. A large proportion of the significant impacts may be of the indirect kind, necessitating a carefully designed program of analysis to trace the chains of cause and effect.

In order to distinguish BART impacts from changes that might have occurred even if BART had not been built, the program will identify the set of decisions that would most likely have been made if the rapid transit proposal had been rejected, and will project the probable consequences of these decisions to provide a basis for comparison with the actual outcome.

A variety of data collection methods will be employed, as required by the various kinds of phenomena to be examined. There will be a substantial amount of data compilation from existing sources in order to provide the data base needed by the various projects. New data will be collected by field surveys (home interviews, traffic counts, etc.) to the extent that existing data are insufficient. In addition to quantifiable facts, the program will collect and analyze non-quantifiable information about impacts on such subjects as public policy and life styles.

Two kinds of comparison will be principally relied upon to identify impacts and trace their causes. Comparisons of the pre-BART with the post-BART period will attempt to detect changes in trend lines occurring at the time that BART operations begin. Comparisons of areas served by BART with areas not served, or lying at a greater distance from BART stations, will be employed as approximations to a true controlled experiment. The two kinds of comparison will be combined, where feasible, to provide more definitive results.

Such before-and-after or area comparisons implicitly employ a model that represents the state of affairs that would have existed in the absence of BART for comparison with the actual state of affairs. To detect some of the more complex, indirect impacts, more sophisticated models will be needed. Models may also be useful generally in the analysis and interpretation of the data and in formulating the results in a form that can be applied in future decision-making in the Bay Area and elsewhere. But models will only be employed where clearly appropriate and feasible; the program will not devote a major effort to, or place reliance upon, the building of new models (especially models of land use and development).

Another method of detecting impacts will be direct questioning of persons affected. This will be appropriate, for example, in measurement of BART's environmental impacts (noise, esthetics, etc.) on neighborhoods through which the lines pass, as perceived by residents.

In all of the projects, careful attention will be given to problems involved in obtaining statistically significant and valid results, since many of the possible impacts will be small when compared with the background of variability that is due to many factors other than BART.

BART's contribution to Bay Area transportation depends heavily on the means of access to BART stations. Furthermore, BART's impacts will be partly determined by the nature of the competing auto-highway mode. Therefore, the impact program cannot be confined to an examination of the rapid transit system itself, but will consider the bus feeder service, parking facilities and street improvements at the stations, and other features of the transportation system upon which BART riders will depend, as well as the highways to which BART offers an alternative.

FINDINGS AND INTERPRETATION

The findings of the individual projects will be summarized in a comprehensive evaluation of BART's impacts. The policy implications of the findings will be spelled out, at each stage, for the information of public officials, their staffs, and citizens. A special effort will be made to produce such policy-relevant findings as fast as the facts become available and to disseminate them promptly. This activity will be performed by MTC personnel whose main purpose is to assure that impact study results are brought directly into use in the planning of transportation and urban development in the Bay Area, and are made available (with evaluation of their transferability) to decision-makers in the national government and other metropolitan areas.

The four-year program now under way is designed to produce a comprehensive measurement and evaluation of the entire range of BART impacts. However, some of the most important potential impacts, such as those upon land use and living patterns, will continue to unfold over a longer period. A subsequent program of monitoring and evaluation, to trace these continuing impacts, will be considered as the proposed program nears its end. Such a continuing program should include an evaluation of the methods employed in the impact program, both to guide the subsequent monitoring and to contribute to improved designs for subsequent impact analyses here and elsewhere.

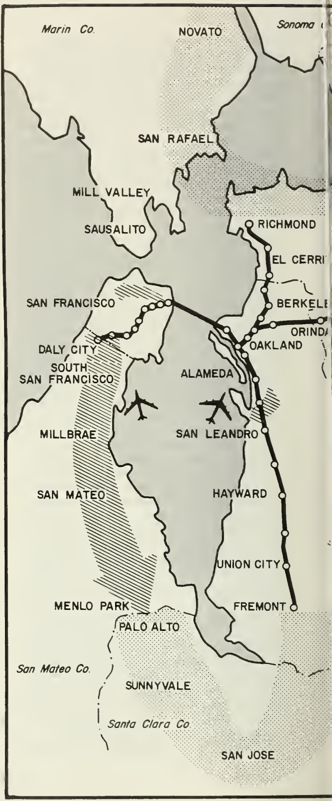
EARLY ACCOMPLISHMENTS

MTC has laid out the plans for the comprehensive, four-year assessment program, including the necessary organization, staffing, financial management, data management, and other supporting activities. This Program Description is the first published descriptive statement on the program.

Researchers at the University of California, Berkeley, have collected several kinds of "perishable" pre-BART data. Each data collection project was planned as the first stage of a larger project involving collection of additional data after commencement of BART operations, and analysis and interpretation of the data. The program plans include provision for work substantially along the lines of each of the proposed projects. However, further work on all of these subjects will be conducted by whatever contractors or consultants are selected for this purpose in a manner to be further specified by RFP's, contractor responses, and negotiated contract terms.

These data collection projects have also involved the development of appropriate instruments, exploration of available data sources, and refinement of analytical methods. The initial data collection activities and the research projects toward which they are designed to contribute are briefly described below:

1. *Behavioral model of travel demand*
   A home interview survey in BART's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OAKLAND
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SAN LEANDRO
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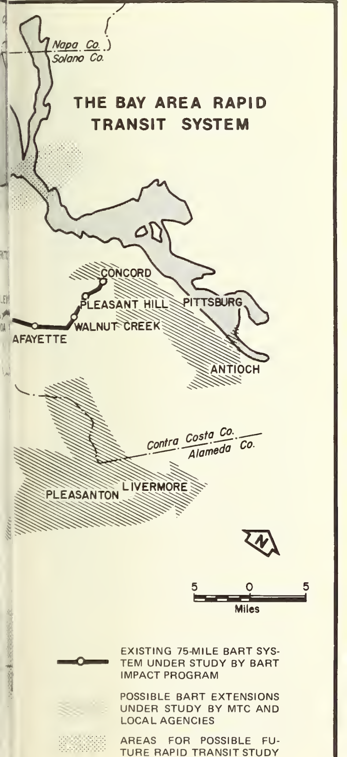

THE BAY AREA RAPID TRANSIT SYSTEM

Napa Co.
Solano Co.
CONCORD
PLEASANT HILL
PITTSBURG
WALNUT CREEK
AFAYETTE
ANTIOCH
Contra Costa Co.
Alameda Co.
PLEASANTON
LIVERMORE
N
5
0
5
Miles
EXISTING 75-MILE BART SYSTEM UNDER STUDY BY BART IMPACT PROGRAM
POSSIBLE BART EXTENSIONS UNDER STUDY BY MTC AND LOCAL AGENCIES
AREAS FOR POSSIBLE FUTURE RAPID TRANSIT STUDY

East Bay service area produced approximately 200 interviews with persons who work in downtown San Francisco, Oakland, Berkeley, or Emeryville, and who can get to work both by auto and by transit. The interviews elicited detailed information about socio-economic characteristics of the household and traveler, the characteristics of the work trips (time, cost, etc.) by each mode, and actual travel patterns, as well as information on a number of other factors affecting the choice of mode, route and travel schedule. The data were collected with the objective of providing pre-BART data for a panel study to be used in designing, calibrating, and testing a disaggregated model of travel demand,employing a conditional logit formulation. Principal investigator: Professor Daniel L. McFadden, Department of Economics.

2. *Study of the traveler's response*

A home interview survey in BART's East Bay service area produced approximately 350 interviews with persons chosen to represent several distinctive kinds of traveler (about 50 in each group): elderly, handicapped, poor, black, teenagers, housewives, and commuters. The interviews elicited detailed information about socio-economic characteristics of household and traveler; knowledge of, and attitudes toward, BART and other modes, including detail on many attributes of the travel experience as influenced by the immediate environment provided by vehicle, station, etc.; and actual travel patterns. The data were collected with the objective of providing pre-BART data for a panel study of traveler responses to BART. Principal investigator: Professor Donald Appleyard, Department of Landscape Architecture; Associate: Dr. Frances M. Carp.

3. *Unmet travel needs*

Data on differences among households in members' access to motor vehicles was assembled from the 1970 census and the Bay Area Survey, which consisted of more than 1000 home interviews conducted in five counties by the University's Survey Research Center in 1971. The data were analyzed to identify differences in auto accessibility as affected by such variables as age, sex, ethnic group, and income. The objective of this project is to lay the foundation for an evaluation of BART's contribution to meeting travel needs that are now unsatisfied. Principal investigator: Professor Donald L. Foley, Department of City and Regional Planning.

4. *Residential environment*

A home interview survey produced approximately 2500 interviews within one mile of the BART lines on both sides of the Bay and another 600 concentrated within one-fourth mile of 27 selected sites (BART stations or line segments). The interviews elicited detailed information about socio-economic characteristics of the household and perceptions of and attitudes toward the quality of the neighborhood environment. In the 26 selected areas, some important attributes of the environment were measured, either by instrument or by evaluation by trained observers. In the same areas, behavior of the residents and passers-by as affected by transportation facilities was observed. The data were collected with the objective of providing a measurement of the gradients of BART's environmental impacts as affected by system design, distance, topography, socio-economic characteristics of the population, and other variables. The project design contemplates two or more additional surveys of comparable population samples, with associated behavioral observations and environmental measurements, at intervals after the commencement of BART operations. Principal investigator: Professor Donald Appleyard, Department of Landscape Architecture; Associate: Dr. Frances M. Carp.

5. *Land Use Decision-making*

Exploratory interviews were conducted with a number of decision-makers (developers, executives of financial institutions, etc.) to obtain information on the factors affecting changes in land use near BART stations. This project also collected and made a preliminary analysis of selected data on land prices, made case study analyses of selected parcels of property near BART stations, and developed a method for a land use information system to be used in monitoring BART-induced change near stations. All of this work was done with the objective of laying the basis for systematic monitoring of changes in land use, development, property values, and other variables as affected by BART. Principal investigator: Assistant Professor Douglass B. Lee, Jr., Department of City & Regional Planning.

6. *Distribution of retail sales*

Arrangements were made with state tax authorities to preserve prior years' data on retail sales tax collections in selected retail areas, both near BART stations and along major highways. The data have been preserved with the objective of establishing a time series of retail sales data for detection of the impact of BART on the geographical distribution of retail sales. Principal investigator: Professor Louis P. Bucklin, School of Business Administration.

7. *Economic factors in urban transportation decision-making*

Information on key decisions relating to BART (to proceed with the system, location and design of stations, fares, relations with local transit agencies, and the quest for funds needed to complete the system) was collected by interviews and study of publications and documents. The data were collected with the objective of providing a basis for analysis and interpretation of the decision-making process. Principal Investigator: Assistant Professor Leonard Merewitz, School of Business Administration.

Some other kinds of data are being collected by MTC during the period before the full BART system is operational. With financial support by DOT, home interview surveys will be conducted in four residential areas (two in the East Bay, and two in the West Bay). Approximately 400 interviews with randomly chosen respondents in each area will provide data on socio-economic characteristics, travel behavior, and characteristics of each of the available modes. The objective of this data collection is to provide data for a panel study of responses to BART, providing a larger sample than the other home interview surveys and covering all kinds of travelers and trips.

Another MTC data collection effort has been financed by the California Department of Transportation, which has also provided technical personnel for planning and supervising the field work. Pre-BART data on traffic volumes (including both vehicles and persons) were collected at nine screen lines crossing the BART corridors and at cordon lines around six BART stations. Data on highway travel times are being collected on those highways which parallel or feed the BART system and are subject to peak-hour congestion and delay. All of the highway data are collected with the objective of providing pre-BART data for comparison with post-BART conditions.

NEXT STEPS

During Fiscal Year 1974 work will proceed on two of the major impact areas — Transportation System and Travel Behavior, and Environment — while methodology will be further developed for the other four areas. A data management system for all BART impact data, integrated with the MTC data system, will be established. A Strategic Plan for carrying out the entire four-year program will be prepared. Certain specialized tasks of data collection and analysis, not suitable for inclusion in the contracts by which work on the major impact areas is to be conducted, will be performed.

As the program moves into full-scale operation, increased attention will be devoted to establishing contacts with public agencies, research organizations, citizen groups, and others with an interest in impact assessment. As the first results begin to flow in, these will be interpreted and disseminated to decision-makers in the Bay Area and elsewhere.

OPPORTUNITIES FOR PARTICIPATION

MTC and the funding agencies invite the interest and participation of public agencies, consulting firms, researchers, and citizens in the BART Impact Program. Information on the progress of the program, and on specific opportunities for participation, will be sent to all who express interest. Communication will be organized in terms of four categories:

Research and consulting organizations (profit and non-profit) that express interest in contracting to perform some of the program work will be asked to indicate which of the major impact areas are of interest to them and to submit information on their qualifications and experience for consideration in the pre-qualification process.

Scholars and experts who express interest in performing or advising upon program activities on a personal services basis, or in participating in seminars and review panels, will be advised when such opportunities arise. Those who wish to be kept informed of program methods and results will be provided with technical reports.

Public agencies that wish to be kept informed of program methods and results will be provided with reports and summaries, and will be invited to send personnel to seminars and other kinds of meetings.

Citizens who wish to be kept informed of the program, and to participate in stating its detailed objectives and evaluating its results, will be provided with non-technical reports and invited to attend meetings at which their ideas can be heard.

Any organization or individual wishing to participate in the program or to be kept informed about it should write to the Project Manager, briefly stating the kind of interest.

Correspondence should be addressed to:
Mr. Noel R. Marsh, Project Manager
BART Impact Program
Metropolitan Transportation Commission
Hotel Claremont
Berkeley, California 94705

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PROGRESS SINCE JULY, 1973

Since the first printing of this brochure in July 1973, the BART Impact Program has made substantial progress, and has also encountered several new developments that will require some significant adjustments of the program design. This section and the next have been added to provide a brief review of the events since July and a statement of some current issues, leaving the rest of the text unchanged except for a few small revisions.

Contractors for the first two of the six study areas (Environment, and Transportation System and Travel Behavior) have been chosen and will be at work early in 1974.

In two other study areas (Land Use and Urban Development, Public Policy) consultants are now proceeding with the development of methodology (building upon work already done by the research team at the University of California and by MTC consultants). Methodological development will begin shortly in the remaining two study areas (Economics and Finance, and Institutions and Life Styles).

A final round of data collection, to be completed before the commencement of BART's transbay service is now underway. This includes home interviews in four residential areas and some additional traffic data surveys, as described on pp. 16-17.

Data resulting from MTC's state-funded traffic counts and travel time studies have been edited and prepared for analysis, and detailed documentation of data collection procedures has been prepared.

Recruitment of MTC staff for the BART Impact Program has been completed. The staff now includes eleven professional people representing several disciplines.

Attention is now turning to refinement and revision of program plans in the light of experience to date, comments and criticisms that have been received, and some current events that will have a substantial influence on any assessment of transportation impacts.

Increased attention is being given, in the plans for most of the impact areas, to the impacts of BART on minority groups. While the original program design called for evaluation of the manner in which BART's benefits and costs are distributed among various population groups, it did not refer in detail to the special problems of ethnic and linguistic minorities, or to the transportation-disadvantaged, such as the elderly, teenagers, the poor and the handicapped. This concern is now reflected in the plans, especially for the study of BART's influence on personal mobility, and on the distribution of population and land uses.

A central issue in assessing BART's impacts on minority groups is its role in the continuing process of outward movement by middle income people and industrial employment, which leaves minority populations stranded in the inner cities, far from the jobs that they need. BART would seem to encourage the trend of population movement by providing a better link between suburban homes and downtown jobs, while doing little for minorities which need access to industrial employment that is rarely located close to a rapid transit station. This hypothesis needs to be carefully tested; and to the extent that it is confirmed, its implications need to be brought to the attention of the decision makers responsible for such things as suburban feeder service and metropolitan housing policies.

Another issue that is being given closer attention is the role of security problems in travelers' choice of mode. The growing risk of crime or unpleasantness on transit vehicles, in stations, and on the sidewalks used by transit riders has severely affected transit ridership in many cities. Security is perhaps as important a factor as other variables more commonly employed in predictive models, such as time and cost, especially for the off-peak, nonwork trips that transit systems can serve most economically. How will security concerns affect ridership of BART and its feeders? Do BART stations introduce new hazards within neighborhoods? What can be done to minimize the adverse effects of this factor? These questions will be addressed in several of the tasks, including the studies of travel behavior and environmental impact.

CURRENT ISSUES

Detecting the consequences of a new transportation facility, in the midst of the continuing processes of change in a large metropolitan area, is no easy task under the best of conditions. The ideal situation for an impact study would be the instantaneous start-up of the new facility at a time when little change is occurring in other factors that influence travel behavior and the other variables of interest. These conditions are rarely, if ever, fulfilled in the real world. In the Bay Area of the mid-1970's, they are so far from being fulfilled as to raise major issues for the impact program.

The start-up of the various parts of the BART system has been spread over the period from September 11, 1972, when the Oakland-Fremont line began operation, to November 5, 1973, when regular service began between downtown San Francisco and Daly City. The inauguration of transbay service has been repeatedly postponed while a solution for defects in the automatic train control system was sought, and it now appears that regular service between San Francisco and the East Bay communities will not begin until the end of 1974.

Furthermore, the current BART operations are now limited to weekdays from early morning to early evening. It is not yet known when the system will achieve the full service schedule, which will cover twice as many hours each week.

The prolonged start-up period will naturally produce a gradual response by travelers to the availability of BART, instead of the sharper change in travel patterns that might have been expected if the whole system had gone into operation in a relatively brief period. The gradual change will be correspondingly more difficult to detect against the background of continuing changes, due to a multitude of factors, in travel, land use and other variables.

To compound the difficulties, important changes in travel seem likely to result from two other forces during the next few years. The Federal Government's plans for reduction of air pollution call for severe restraints on automobile usage and encouragement of transit in metropolitan areas. Even if some of the currently proposed measures should not be carried out, it is safe to say that growing concern about air pollution, combined with inability of exhaust controls to achieve sufficient reductions in the foreseeable future, are likely to impose some constraints on auto usage and further measures to encourage transit usage in the Bay Area — leading to precisely the kinds of changes in travel behavior that are presumed to flow from the inauguration of rapid transit service.

Another force, tending in the same direction, is the restricted availability of gasoline that now looms over the entire nation, and will influence the motorist in the form of shortages, rationing, higher prices, or a combination of these. Again, the impact program must be able to distinguish the results of this situation from the effects of BART.

These forces will not only exacerbate the difficulties of the researcher, but bring a whole new family of problems for the policy maker. They may, in particular, change the prevailing definition of BART's task from "luring" the motorist away from his car by offering luxurious travel service to carrying unexpected numbers of transit riders in a reasonably satisfactory manner.

The impact program must find ways to sort out the consequences of BART from those of these new "confounding variables," and must aim to produce findings that will help local, state, and Federal policy makers and transit operators to meet the new challenge.

Resolution of these issues is a task for the immediate future, as the detailed work plans of the first two contractors are formulated and the program for Fiscal Year 1975 is prepared. The initial approach to the problem is to assume that the data collection and analysis will inevitably be reflecting all of the forces at work whether this is desired or not, and that the best course is to make a virtue of the situation and explicitly recognize that we are monitoring the consequences not only of BART but of governmental clean-air programs and national petroleum scarcities. These are certainly forces that need to be understood by MTC, the Bay Area's transportation planning agency, and by the state and federal funding agencies, and the impact program should be able to throw some useful light on them.

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APPENDIX: QUESTIONS TO BE ANSWERED

Plans for the BART Impact Program are guided by a set of questions to which answers are sought. These questions express the interests of policy makers, the hypotheses of researchers, and the concerns of the citizens who are paying for the rapid transit system. The data to be collected, and the analysis and interpretation, are designed to answer one or more of these questions.

The questions are of three kinds:

What are the impacts of BART on travel conditions, economic activity, land use, public policies, and other aspects of life in the metropolitan region?

Why do these impacts occur? Of equal interest, why do some anticipated impacts not occur, or occur in a lesser or different way than expected?

How can the fullest possible benefits be obtained from the Bay Area's investment in rapid transit, by complementary actions such as provision of feeder service, marketing transit service, and zoning for intensive development around the stations? Equally important, how can the lessons of the BART experience be transferred to other metropolitan areas where investments in transportation improvement are being considered?

These three kinds of questions will be asked about the entire range of potential BART impacts. The principal anticipated impacts are covered by the following questions:

1. **What** change does BART produce in the *level of transportation service* available to Bay Area residents?

   Why are these changes produced (replacement of buses by rail transit, reduction of highway congestion, etc.)? Why is the level of service not changed in some areas (high fares, lack of feeder service, etc.)?

   How can the level of service be improved by modifications of BART or complementary services (revised BART schedules, more bus feeder service, etc.)?

2. **What** changes does BART produce in the *cost of serving various trips?*

   Why do these changes occur (manpower requirements of an automated system, energy requirements of rapid transit, etc.)?

   How can costs be reduced (encouraging off-peak travel, rider education to discourage littering, etc.)?

3. **What** changes does BART produce in *public attitudes* toward travel and transportation?

   Why do these changes occur (removal of anti-transit prejudice based on previous experiences with less modern systems, generation of hostility by imposition of BART taxes, etc.)? Why do some attitudes remain unaffected (insufficient marketing campaign, bias in mass media, etc.)?

   How can desired attitudes to transit be encouraged (better schedule information, special efforts to reach prospective riders through their social and cultural groups, etc.)?

4. **What** changes does BART produce in *travel behavior?*

   Why do these changes occur (faster travel, greater amenity, etc.)? Why do some people make no changes in their behavior (value placed on auto travel by prevailing culture, fear of subterranean travel, inconvenient routes or schedules, etc.)?

   How can desired changes be produced (improved levels of service, economic incentives, etc.)?

5. **What** changes does BART produce in *highway traffic congestion?*

   Why do these changes occur (shift of motorists to rapid transit, addition of park-and-ride trips to some streets, etc.)? Why is congestion not reduced as anticipated ("sharpening" of the peak, return of trucks to peak-hour operation, etc.)?

   How can BART contribute to relieving congestion (widening streets on approaches to BART stations, scheduling to complement traffic flow controls on parallel routes, etc.)?

6. What changes does BART produce in air pollution, use of energy resources, noise levels, community appearance, and other *environmental qualities?*

   Why do these changes occur and why not where anticipated (changes in automotive travel, intrusion of overhead structures, operation of steel wheels and rails, etc.)?

   How can BART's effect on the environment be enhanced (noise suppression, additional landscaping, design features, etc.)?

7. What changes does BART produce in *land use?*

   Why do these changes occur (making sites near stations attractive for high-volume retail activities, encouraging decentralization of employment, etc.)? Why are changes not as anticipated (restrictive zoning, withholding of land by speculators, etc.)?

   How can BART contribute to more beneficial land use patterns (public acquisition of land for intensive development, special incentives for private developers, etc.)?

8. What changes does BART produce in *large-scale patterns of urban development* and growth, and in the *distribution of population?*

   Why do these changes occur (attraction of employers from other parts of the Bay Area, enhanced accessibility of outlying areas for residential development, etc.)? Why are the effects not as anticipated (speculative rise in land values, shift of development to earthquake hazard or other geologically sensitive areas, etc.)?

   How can BART influence more beneficial patterns of growth and population distribution (development of new towns, open space preservation programs, etc.)?

9. **What** changes does BART produce in the level and distribution of *economic development and employment?*

   Why do these changes occur (attracting employment from other metropolitan areas, improving the match of workers and jobs, etc.)?

   How can BART encourage more favorable economic and employment impacts (complementing rapid transit with job placement and training services, highlighting BART in the region's promotional literature, etc.)?

10. **What** changes does BART produce in *institutional patterns and life styles?*

    Why do these changes occur (enabling people to take part in new social activities, providing workers with more free time, improving travelers' knowledge of the location of regional and community facilities and landmarks along the routes, etc.)?

    How can BART help achieve more beneficial impacts on institutions and social life (institutional planning in communities along BART lines, providing new opportunities for upward social mobility to complement geographic mobility, etc.)?

11. **What** changes does BART produce in the *distribution of social benefits and costs?*

    Why do these changes occur (increased land values, higher incomes of workers who can reach better jobs, etc.)?

    How can a greater, equitably distributed net benefit from BART be obtained (more feeder service to low-income areas, refinancing the debt with the aid of Federal grants, etc.)?

12. **What** changes does BART produce in *public policy* at the Federal, state, regional and local levels?

    Why do these changes occur (reducing the demand for highways, creating a nation-wide demand for more modern transit, etc.)? Why are the changes in public policy not as expected (diverting attention from needed street modernization, pre-emption of local borrowing and taxpaying capacity needed for education and social services, etc.)?

How can BART encourage more constructive public policies (documenting the benefits of rapid transit investments, providing planners with better information on the land use impacts of transportation, etc.)?